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*1972 Suggested
Insecticide
Guide*

Insect Control for COMMERCIAL VEGETABLE CROPS and GREENHOUSE VEGETABLES

Commercial vegetable gardeners find it impossible to produce vegetables profitably unless they control insects at maximum efficiency and minimum cost. The housewife of today will not accept unsightly wormy vegetables; not only are wormy fruits and vegetables unappetizing but the waste from trimming increases food costs. Thus the commercial vegetable gardener must produce a quality product that is acceptable and safe to the consumer. Careful and correct use of the right insecticides will enable him to do this.

This suggested insecticide guide has been prepared for use by Illinois commercial vegetable farmers; it is not for home gardeners, who should use only those insecticides that are extremely safe to handle, apply, and store. Furthermore, the commercial vegetable gardener must use a wider variety of insecticides than the home gardener in order to obtain maximum insect control at the least cost.

In using insecticides, read the label and carefully follow the instructions. Do not exceed maximum rates suggested; observe carefully the interval between application and harvest, and apply only to crops for which use has been approved. Make a record of the product used, the trade name, the percentage content of the insecticide, the dilution, the rate of application per acre, and the date or dates of application.

Some of the insecticides suggested here can be poisonous to the applicator. In using them, the commercial gardener is expected to use precautions to protect himself, his workers, and his family from undue or needless exposure.

In using this guide, always refer to the table on the next page, which lists the limitations and restrictions on use. These limitations apply to the vegetables as human food. If you use any portion of a vegetable for

livestock food (tops, stalks, etc.) refer to the label for instructions as to the interval required between application and feeding.

The chemical names used in these tables may be unfamiliar to you. These names are the common coined chemical names and as such are not capitalized. Trade names are capitalized. In the table of limitations the common names are listed first. If the trade name is more commonly used, it is listed in parentheses following the common name. Throughout the tables of suggestions, however, the common name is used if there is one. In case of question, refer to the table of limitations.

These suggestions are subject to change without notification during the growing season.

The publication was prepared by entomologists of the University of Illinois College of Agriculture and the Illinois Natural History Survey.

Requested label clearances for a few uses of insecticides, carriers, and solvents is uncertain for 1972, since many requests have not been officially cleared. Anticipating needed changes in labeling, we began modifying these suggested uses a few years ago. We have attempted to anticipate any further label changes in 1972, but an occasional use may still be canceled. Be sure to check with your county extension adviser if you are in doubt about the insecticide you plan to use. We will make announcements of label changes through the news media to keep you up to date.

Suggestions for use of insecticides effective from a practical standpoint are based on available data. Soil texture, pH of the soil, rainfall, slope of the field, wind velocity at planting, method and accuracy of application, and other unpredictable factors affect efficiency of insecticides.

UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN COLLEGE OF AGRICULTURE COOPERATIVE EXTENSION SERVICE
In cooperation with ILLINOIS NATURAL HISTORY SURVEY CIRCULAR 897 Urbana, Illinois, December, 1971

Issued in furtherance of Cooperative Extension Work, Acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture.
JOHN B. CLAAR, Director, Cooperative Extension Service, University of Illinois at Urbana-Champaign.

LIMITATIONS FOR FIELD VEGETABLES IN DAYS BETWEEN APPLICATION AND HARVEST AND OTHER RESTRICTIONS ON USE OF INSECTICIDES IN ILLINOIS

(Blank spaces indicate the material is not suggested for the specific use in Illinois)

Insecticide	Beans	Broccoli	Brussels sprouts	Cab- bage	Cauli- flower	Horse- radish ¹	Radish ¹	Turnip ¹	Onions	Egg- plant	Peppers	Toma- toes
azinthosmethyl (Guthion) ².....	...	15	7	21	15	...	...	...	...	...	...	...
carbaryl (Sevin).....	0	3	3	3	3	3	3	3,14G	...	0	0	0
Dasanit.....	...	...	...	...	...	...	...	...	I, J	...	...	...
diazinon.....	...	5	...	7	5	...	10	10	10	...	...	1
dicofol (Kelthane)....	7C	...	...	...	...	...	...	...	...	2	2	2
dimethoate (Cygon)...	0C	7	...	3	7	...	...	14	...	...	0	7
endosulfan (Thiodan)	CH	7	...	7	B	...	...	...	...	...	...	...
ethion.....	...	...	...	...	...	...	...	...	I	...	...	...
Fundal.....	...	14K	14K	14K	14K	...	...	...	...	...	...	...
Galecron.....	...	14K	14K	14K	14K	...	...	...	...	...	...	...
malathion.....	1	3	7	7	7	7	7	3	3	3	3	1
methomyl (Lannate)...	...	7	...	1	7	...	...	...	...	...	...	2
mevinphos (Phosdrin) ².....	...	1	3	1	3	...	...	3	...	...	...	...
naled (Dibrom).....	...	1	1	1	1	...	...	4	...	...	...	...
parathion ²	7	7	7	10	7	...	15	10	...	15	15	10
phorate (Thimet) ² ...	I	...	...	...	...	...	...	...	...	...	...	...
rotenone.....	...	...	...	...	...	...	...	...	...	1	1	1
toxaphene.....	...	...	B	7D	B	C	C	C	...	5	5	3
trichlorfon (Dylox)...	...	...	21	21	21	...	...	28C	...	...	21	21

Insecticide	Pota- toes ¹	Col- lards	Kale	Lettuce	Spinach	Swiss chard	Sweet corn	Cucum- bers ³	Melons ³	Pump- kins ³	Squash ³	
											Winter	Summer
carbaryl (Sevin).....	0	14	14	14	14	14	0	0	0	0	0	0
diazinon.....	...	10	10	10	10	12	1	7	3	...	3	7
dicofol (Kelthane)....	...	...	...	...	...	...	...	2	2	2	2	2
dimethoate (Cygon)...	0	14	14	14	14	14	...	...	3	...	...	...
dyfonate.....	...	...	...	...	...	...	I	...	...	...	...	...
endosulfan (Thiodan)	0	...	...	14A	...	...	...	...	...	...	...	...
Gardona.....	...	...	...	...	...	...	0,5G	...	...	...	...	...
malathion.....	0	7	7	14	7	7	5	1	1	3	1	1
methomyl (Lannate)	...	...	...	...	...	...	0,3G	...	...	...	...	...
mevinphos (Phosdrin) ²	...	3	3	2	4	...	...	...	...	...	...	...
naled (Dibrom).....	...	4	4	1	1	1	...	...	...	...	...	...
parathion ²	5	10	10	21	14	21	12	15	7	10	15	15
phorate (Thimet) ² ...	I	...	...	...	...	...	I	...	...	...	...	...
rotenone.....	...	1	1	1	1	1	...	...	...	...	...	...
toxaphene.....	0	B	28	E	21F	E	B	B	B	B	B	B
trichlorfon (Dylox)...	...	28B	21	28B	...	...	...	...	...	14F	...	...

¹ Root crops such as radishes, turnips, carrots, horseradish, potatoes, and sugar beets should not be grown in soil where aldrin, dieldrin, or heptachlor was applied as a soil insecticide the preceding year.

² Use only by professional applicators or commercial gardeners.

³ Only apply insecticide late in the day after blossoms have closed to reduce bee kill.

A. Not more than twice per season.

B. Not after edible portions or heads begin to form.

C. Do not use tops for feed or food.

D. If outer leaves are stripped; otherwise, B.

E. Do not apply after seedling stage.

F. Not more than once per season.

G. If tops or stover is to be used as feed.

H. Not more than three times per season.

I. Soil applications at planting time only.

J. Do not use on green onion crop.

K. No more than nine applications.

LIMITATIONS FOR GREENHOUSE VEGETABLES

Insecticide	Tomatoes	Lettuce
endosulfan (Thiodan).....	15 hours	...
malathion.....	15 hours	10 days
metaldehyde.....	As bait only applied to soil	
naled (Dibrom).....	1 day	...
parathion ¹	10 days	21 days
tepp ¹.....	...	3 days

¹ Do not use aerosols that contain parathion, tepp, or the propellant methyl chloride in greenhouses connected to living quarters. Should be applied only by a trained operator.

CABBAGE AND RELATED COLE CROPS¹

Insect	Time of attack	Insecticide	Lb. of active ingredient per acre	Placement	Timing of application
Cabbage maggot ² (NHE-44)	All season	diazinon	3	Broadcast	Disk in just before planting. Use only for cabbage, cauliflower, and broccoli.
		diazinon granules	1	Furrow	At time of planting; on turnips a drenching spray of 1 lb. diazinon should be applied 30 days following treatment.
		azinphosmethyl	3 oz. W.P. or 2 oz. E.C. per 50 gal. transplant water		6 fluid oz. transplant water per plant.
		diazinon	4 oz. per 50 gal. transplant water		
Aphid (NHE-47) Thrips (NHE-48)	All season	azinphosmethyl dimethoate malathion mevinphos parathion	$\frac{3}{4}$ 0.3 1 $\frac{1}{4}$ 0.4	Foliage	When aphids appear, but before leaves begin to curl.
Diamond-back moth larva; imported cabbage worm; cabbage looper (NHE-45)	All season	bacillus thuringiensis ⁴	See rates on label	Foliage	When small worms first appear, and about every 5 to 7 days thereafter. Thorough spray coverage of foliage is important. Fundal and Galecron control only the egg stage plus newly hatched worms.
		Fundal	0.5		
		Galecron	0.5		
		methomyl	0.45-0.9		
		naled	1		
		parathion with endosulfan ³	$\frac{1}{2}$ 1		
Cutworm	At planting	trichlorfon toxaphene	1 1½-2	Soil	At planting, at base of plant or as needed when damage first occurs.
Flea beetle and leafhopper	All season	carbaryl	1½	Foliage	As needed.

¹ Root crops such as radishes, turnips, carrots, potatoes, and sugar beets should not be grown in soil where aldrin, dieldrin, or heptachlor was applied as a soil insecticide the preceding year.

² Maggots are resistant to aldrin, dieldrin, and diazinon in some areas of Illinois.

³ When using mixtures that have different "days between application and harvest" restrictions, choose the larger restriction.

⁴ No time limitations.

Note: E.C. = emulsion concentrate; W.P. = wettable powder.

COLLARDS, KALE, LETTUCE, SPINACH, SWISS CHARD

Insect	Time of attack	Insecticide	Lb. of active ingredient per acre	Placement	Timing of application
Aphid (NHE-47)	All season	diazinon	$\frac{1}{2}$	Foliage	As needed.
		dimethoate	0.3		
		mevinphos	$\frac{1}{4}$		
		naled	1		
		parathion	0.4		
Cutworm	On seedling plants	toxaphene	1½	Base of plant and soil	When first damage appears.
		trichlorfon	1		
Leafhopper	All season	carbaryl	1½	Foliage	When first leafhoppers appear and as needed.
		dimethoate	0.3		
		malathion	1		
Caterpillar (NHE-45)	All season	bacillus thuringiensis ²	See rates on label	Foliage	When small worms first appear and every 5 to 7 days thereafter.
		naled	1		
		parathion	$\frac{1}{2}$		
		with endosulfan ¹	1		
Leaf miner	All season	diazinon	$\frac{1}{2}$	Foliage	When first miners are observed.
		dimethoate	0.3		
		parathion	0.4		
Flea beetle	All season	carbaryl	1	Foliage	As needed.
		rotenone	$\frac{1}{4}$		

¹ When using mixtures that have different "days between application and harvest" restrictions, choose the larger restriction.

² No time limitations.

BEANS

Insect	Time of attack	Insecticide	Lb. of active ingredient per acre	Placement	Timing of application
Seed maggot (NHE-27)	All season	dieldrin ¹	Manufacturer's directions	Seed	At seeding.
		diazinon 50% W.P. ¹	3/5 oz./bu.	Seed	Treat seed no longer than 3 months before planting.
		phorate granules	1½	Soilband	Place on either or both sides of row at planting but not in contact with seed.
Bean leaf beetle (NHE-67)	Early and late season	carbaryl malathion	1 1	Foliage	When feeding first appears and weekly for 2 or 3 applications as needed.
Leafhopper (NHE-22) and plant bug (NHE-68)	All season	carbaryl dimethoate	1 0.3	Foliage	Before plants become yellow and stunted. Repeat applications at weekly intervals as necessary.
		malathion	1		
		phorate granules	1½	Soilband	As for seed maggot.
Mexican bean beetle	Midseason and late season	carbaryl	½	Foliage	When occasional leaves show lacework feeding.
		malathion	1		
		phorate granules	1½	Soilband	As for seed maggot.
Aphid (NHE-47)	All season	dimethoate	0.3	Foliage	Usually applied when a few aphids can be found on each plant, but before leaves begin to curl and deform.
		endosulfan	½		
		malathion	1		
		phorate granules	1½	Soilband	As for seed maggot.
Blister beetle (NHE-72)	Midseason and late season	carbaryl	1½	Foliage	As needed.
Corn earworm (NHE-33) Corn borer	Late season	carbaryl	1½	Foliage	As needed, but usually after September 1. Worms may be present before bloom.
		parathion	½		
Mites	Midseason and late season	dicofol	0.4	Foliage	As needed, but especially during drouthy periods particularly if carbaryl has been used on crops.
		dimethoate	0.3		
		malathion	1		
		phorate granules	1½	Soilband	As for seed maggot.

¹ No restrictions when used as recommended.

CUCUMBERS AND OTHER VINE CROPS¹

Insect	Time of attack	Insecticide ²	Lb. of active ingredient per acre	Placement	Timing of application ²
Striped and spotted cucumber beetles (NHE-46)	Seedling to mature plants	carbaryl parathion	1 ½	Foliage	When beetles first appear; as often as necessary thereafter.
Aphid (NHE-47)	All season	diazinon	½	Foliage	When aphids become noticeable.
		dimethoate	0.3		
		malathion	1		
		parathion	½		
Squash bug (NHE-51)	All season	parathion	½	Foliage	Do not apply until first eggs are found hatching (about June 15 to July 15).
		trichlorfon ³	1		
Leafhopper	July-August	malathion	1	Foliage	As needed.
		dimethoate	0.3		
Squash vine borer	June-September	carbaryl	1	Base of stem for 3 ft.	Weekly applications when vines begin to run—usually 5 applications.
Pickle worm	August-September	carbaryl	1	Foliage	Weekly applications, beginning in late August.
Mites	July-September	dicofol	½	Foliage	As needed.
		malathion	1		
		parathion	½		
Cutworm (NHE-77)	April-June	carbaryl	2	Base of plants	As needed.
		toxaphene	1½-2		

¹ Pumpkins should not be grown on soil that has been treated with aldrin, dieldrin, or heptachlor the preceding year.

² Spray vine crops with insecticide only late in the day after blossoms have closed to reduce bee kill.

³ Pumpkin is the only vine crop for which trichlorfon should be used for squash bug control. Apply only once per season.

TOMATOES, PEPPERS, EGGPLANT

Insect	Time of attack	Insecticide	Lb. of active ingredient per acre	Placement	Timing of application
Cutworm (NHE-77)	Early and midseason	carbaryl toxaphene trichlorfon	2 3 1	Base of plants or foliage	As needed.
Flea beetle	May-June	carbaryl rotenone	2 0.2-0.4	Foliage	Apply every week as long as needed.
Aphid (NHE-47)	May-July	diazinon dimethoate malathion parathion	$\frac{1}{4}$ 0.3 1 0.4	Foliage	As needed, but before leaves curl.
Corn earworm Corn borer	July-September; occasionally in June	carbaryl toxaphene methomyl ²	2 2 .45-.9	Foliage	Add to weekly applications of fungicide sprays beginning at first fruit set. If spraying is infrequent, use 6 lb. of toxaphene.
Hornworm	July-September	carbaryl trichlorfon	2 1	Foliage	When first small worms appear.
Mites	July-September	carbophenothion dicofol malathion parathion	1 $\frac{1}{2}$ 1 0.4	Foliage	As needed.
Russet mite	July-September	parathion sulfur dust ¹ sulfur spray ¹	0.4 10 10	Foliage	As needed.
Blister beetle (NHE-72)	June-September	carbaryl parathion toxaphene	$1\frac{1}{2}$ $\frac{1}{4}$ 2	Foliage	As needed.
Fruit fly and picnic beetle	August-October	diazinon spray diazinon granules pyrethrin dust ¹	$\frac{1}{2}$ 1 1	Foliage Foliage	When flies or beetles first appear. Apply to hamper immediately after it is filled.

¹ No limitations on use.

² Use cleared only on tomatoes, not on peppers or eggplant.

ASPARAGUS

Insect	Time of attack	Insecticide	Lb. of active ingredient per acre	Placement	Timing of application
Asparagus beetle (NHE-49)	Early and mid-season on spears and ferns	carbaryl ¹ malathion ¹ rotenone ¹	$1\frac{1}{2}$ 1 0.2-0.4	Spears and ferns Spears	As needed, not more often than every 3 days. As needed.

¹ One-day restriction between last application and harvest.

SWEET CORN

Insect	Time of attack	Insecticide	Lb. of active ingredient per acre	Placement	Timing of application
Soil insects (NHE-26, 27, 43)	April-August	diazinon dyfonate phorate	1 1 1	Row	Apply on soil surface behind planter shoe and ahead of press wheel.
Cutworm (NHE-38)	April-June	carbaryl ¹ carbaryl bait toxaphene	2-3 1 3	Base of plants	When first damage appears.
Flea beetle (NHE-36)	April-July	carbaryl ¹	1½	Foliage	As necessary.
Japanese beetle (NHE-32)	July-September	carbaryl ¹	1	Ear zone	As necessary.
Corn borer	June-September	carbaryl spray, dust, ¹ or granules diazinon granules	2 1½	Foliage	Make first application when tassel ratio is 30 to 40. Repeat every 4 to 5 days as long as field has 20 or more unhatched egg masses per 100 plants.
Corn earworm ² (NHE-33)	June-September	carbaryl ¹ Gardona methomyl	2 1½ 0.45	Ear zone	Market corn: At first silk and every 2 to 3 days for 5 to 8 applications. On very early or late planted corn, treatment may be necessary before silking when eggs are being laid on stalks and flag leaves. Canning corn: At 30 to 50% silk and every 3 days thereafter until corn is within 1 week of harvest.
Sap beetle (NHE-10) Picnic beetle	July-September	carbaryl ¹ diazinon malathion parathion	2 1 1 ½	Foliage	When adults first appear in field; usually between pollen-shedding and silk-drying.
Corn leaf aphid (NHE-29)	July-September	malathion parathion	1 ½	Foliage	As needed to produce attractive ears for fresh market.

¹ During pollen shed, apply carbaryl as late in the day as possible (preferably after 4 p.m.) to reduce bee kill.

² Addition of 0.5 to 0.75 pound of parathion to carbaryl improves earworm control.

ONIONS

Insect	Time of attack	Insecticide	Lb. of active ingredient per acre	Placement	Timing of application
Onion maggot (NHE-50)	All season	diazinon W.P. ethion W.P.	½-1 for 40-50 lb. of seed 1 for 40-50 lb. of seed	Seed	Seed treatment for set onions only. Use lighter dosage of diazinon on sandy, highly mineral soils.
		Dasanit granules diazinon granules ethion granules	1 ½-1 ½-2	Furrow	Use 1 lb. active ingredient per acre for rows 12" apart; ¾ lb. for rows 18" apart; ½ lb. for rows 24" apart. Up to twice these amounts are needed for ethion on muck soils. Do not use Dasanit on green onions.
		diazinon	2	Broadcast	Preplanting; disk into upper 1 to 2 inches of soil. Supplement with foliage spray below.
		diazinon	⅓	Foliage	Supplemental to soil treatment. Make first application when first adult flies are seen; make another 1 week later. From then on only as necessary.
		malathion	1		
Thrips (NHE-48)	Midseason and late season	diazinon malathion	½ 1	Foliage	When injury first appears and every 10 days as necessary.

POTATOES¹

Insect	Time of attack	Insecticide	Lb. of active ingredient per acre	Placement	Timing of application
Flea beetle	May-July	carbaryl endosulfan spray endosulfan dust	1 $\frac{1}{2}$ 1	Foliage	When first damage appears on leaves, and repeat as needed.
Colorado potato beetle	May-July	carbaryl endosulfan spray endosulfan dust	1 $\frac{1}{2}$ 1	Foliage	As needed.
Potato leafhopper (NHE-22)	May-July	carbaryl dimethoate endosulfan spray endosulfan dust	1 0.3 $\frac{1}{2}$ 1	Foliage	Weekly applications when leafhoppers first appear
		phorate granules	2 to 3	Soilband	Place on either or both sides of row at planting but not in contact with seed. Use lower rate on sandy soils and heavier rate on heavy soils. Do not use on muck soils.
Aphid (NHE-47)	All season	dimethoate endosulfan spray endosulfan dust malathion parathion	0.3 $\frac{1}{2}$ 1 1 $\frac{1}{4}$	Foliage	As needed.
		phorate granules	2 to 3	Soilband	As for leafhoppers.
Blister beetle (NHE-72)	All season	carbaryl toxaphene	$1\frac{1}{2}$ 2	Foliage	As needed.
Wireworm (NHE-43)	All season	phorate granules	2 to 3	Soil	Preplanting, disk in; or use as soilband at planting.
White grub (NHE-23)	All season	phorate granules	3	Soil	Preplanting, disk in; or use as soilband at planting.
Grasshopper (NHE-74)	July-September	carbaryl toxaphene	$\frac{3}{4}$ $1\frac{1}{2}$	Foliage	As needed, control in fence rows, roadsides, ditch banks, etc., before migration.

¹ Potatoes should not be grown in soil where aldrin, dieldrin, or heptachlor was applied as a soil insecticide the preceding year.

GREENHOUSE LETTUCE

Insect	Insecticide ¹	Dosage and formulation	Application
Aphid	malathion aerosol	1 lb. 10% aerosol per 50,000 cu. ft.	In a closed greenhouse above plants.
Garden flea hopper	parathion aerosol	1 lb. 10% aerosol per 50,000 cu. ft.	In a closed greenhouse above plants.
Mealybug Spider mite Whitefly	tepp aerosol	1 lb. 5% aerosol per 50,000 cu. ft.	In a closed greenhouse above plants.
Armyworm	malathion aerosol	1 lb. 10% aerosol per 50,000 cu. ft.	In a closed greenhouse above plants.
Cabbage looper Cutworm Sowbug	parathion aerosol	1 lb. 10% aerosol per 50,000 cu. ft.	In a closed greenhouse above plants.
Slug	metaldehyde	Commercially prepared bait or spray	To mulch on soil surface. Do not contaminate edible parts.

¹ See page 2 for limitations between application and harvest.

GREENHOUSE TOMATOES

Insect	Insecticide ¹	Dosage and formulation	Application
Aphid	endosulfan aerosol	1 lb. 10% aerosol per 50,000 cu. ft.	In a closed greenhouse above plants.
Whitefly	malathion aerosol	1 lb. 10% aerosol per 50,000 cu. ft.	In a closed greenhouse above plants.
	naled vapor	5 oz. of 4% E.C. per 50,000 cu. ft.	Apply on steampipes.
	parathion aerosol	1 lb. 10% aerosol per 50,000 cu. ft.	In a closed greenhouse above plants.
Mealybug Spider mite Russet mite Thrip		Use malathion or parathion aerosol as suggested for aphid and whitefly.	
Armyworm	malathion aerosol	1 lb. 10% aerosol per 50,000 cu. ft.	In a closed greenhouse above plants.
Cabbage looper Cutworm Tomato fruitworm	parathion aerosol	1 lb. 10% aerosol per 50,000 cu. ft.	In a closed greenhouse above plants.
Slug	metaldehyde	Commercially prepared bait or spray	To mulch on soil surface. Do not contaminate edible parts.

¹ See page 2 for limitations between application and harvest.

FOR ADDITIONAL INFORMATION

Leaflets describing the life history, biology, and habits of some of the insects mentioned can be obtained from the offices of county extension advisers or by writing to Office of Agricultural Publications, University of Illinois, Urbana, Illinois 61801. These are indicated by an NHE number in the tables.

Other circulars on insect control are:

Circular 898 — Insect Control for Livestock and Livestock Barns;

Circular 899 — Insect Control for Field Crops;
Circular 900 — Insect Control by the Homeowner;
Circular 1004 — Pest Control in Commercial Fruit Plantings

These can be obtained from the above offices or from the College of Agriculture, Urbana.

FOR YOUR PROTECTION

Always handle insecticides with respect. The persons most likely to suffer ill effects from insecticides are the applicator and his family. Accidents and careless, needless overexposure can be avoided. Here are a few easy rules that if followed will prevent most insecticide accidents:

1. Wear rubber gloves when handling insecticide concentrates.
2. Do not smoke while handling or using insecticides.
3. Keep your face turned to one side when opening insecticide containers.
4. Leave unused insecticides in their original containers with the labels on them.
5. Store insecticides out of reach of children, irresponsible persons, or animals; store preferably in a locked cabinet.
6. Wash out and then bury, burn, or haul to refuse dump all empty insecticide containers.
7. Do not put the water-supply hose directly into the spray tank.

8. Do not blow out clogged nozzles or spray lines with your mouth.

9. Wash with soap and water exposed parts of body and clothes contaminated with insecticide.

10. Do not leave puddles of spray on impervious surfaces.

11. Do not apply to fish-bearing or other water supplies.

12. Do not apply insecticides, except in an emergency, to areas with abundant wildlife or to blossoming crops visited by bees. Avoid drift onto blossoming crops or onto bee hives.

13. Do not apply insecticides near dug wells or cisterns.

14. Do not spray when weather conditions favor drift.

15. Observe all precautions listed on the label.

16. To avoid bee kill, apply insecticides after bee activity has been completed for the day; use the least toxic materials. *Warn beekeepers that you are applying insecticides.*

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